Student Involvement at the 2015 AGU Fall Meeting

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On behalf of the Young Hydrologic Society

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The American Geophysical Union (AGU) Fall Meeting presents myriad opportunities for students and early career scientists to network and advance their research. In the last few years, AGU has increased its student activities to meet demand and promote student leadership.

A Student and Early Career Scientist Conference will take place on the Sunday before the Fall Meeting. This preconference event for students features two tracks—an interdisciplinary science track and a career guidance and professional track. Both will provide ample opportunities to network and connect with peers, as well as facilitate discussions on broadening equality and participation in academia.

This year there are three pop-up talk sessions on: (1) innovations, challenges and future directions in hydrology; (2) social dimensions of geoscience; and (3) interactive demonstrations in Earth sciences. Pop-up talks are 5-minute presentations on a variety of topics not typically covered in posters or oral presentations, and are given by students and early career scientists. For location and times, see *http://fallmeeting.agu.org/2015/students/student-pop-talks/*.

This year, the AGU Meeting offers a mentoring program for undergraduates. If you missed the application deadline, or are a graduate student wanting additional guidance, sign up for the AGU Career Center E-Newsletter, which offers support and opportunities, such as information on Career Advice Workshops during the Fall Meeting.

At the student lounge in the Moscone South Poster Hall, you can meet your Student Representative and learn about impromptu activities. Stop by at 5:30 PM during the conference and pick up menus and walking maps to join other students for dinner.

Hydrologist Bingo is designed to stimulate interaction between young hydrologists and established researchers. Pick up bingo cards at the mixer or at the student lounge. The game will last throughout the conference. Attend the The Consortium for the Advancement of Hydrologic Science Inc. (CUAHSI) mixer on Tuesday from 6-8 PM at Jillian's to complete your card. There will be prizes.

Bottom-up initiatives such as the Young Hydrologic Society and the AGU Hydrology Student Subcommittee aim to involve, connect and empower students and early career scientists. The Hydrology Section Student Subcommittee will host a meeting on Wednesday morning to seek feedback and future representatives; stay updated through Twitter at @AGU_H3S.

The GEWEX Process Evaluation Study: GEWEX-PROES

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Progress in realistically simulating the energy and water cycles in weather and climate models has been slower than desirable. Climate models submitted to the Coupled Model Intercomparison Project Phase-5 (CMIP-5), while more comprehensive than their predecessors, have shown little to no improvement in their biases in simulating key features of the climate system. As a result, uncertainties in global climate and hydrological sensitivities, and in the simulation of regional climate change, have not been reduced significantly.

Such thwarted progress is starkly contrasted against significant advances made in observing the energy and water cycle over the last decade. The advent of spaceborne active remote sensors on the National Aeronautics and Space Administration's (NASA) Tropical Rainfall Measuring Mission (TRMM), Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation (CALIPSO) and CloudSat missions, as well as the recent Global Precipitation Measurement (GPM) Mission and the soon-to-be-launched European Space Agency (ESA) EarthCARE missions, all contribute to a significant increase in our ability to observe clouds and precipitation.

GEWEX-coordinated cloud, precipitation and other data sets, as exemplified by the International Satellite Cloud Climatology Project (ISCCP) and the Global Precipitation Climatology Project (GPCP), have strongly contributed to our growth in knowledge. They have also been accompanied by more reliable estimates of radiative budgets at the top of the atmosphere and improved estimates of surface balances. New measurements, such as those taken by the ESA Soil Moisture and Ocean Salinity (SMOS) mission, and NASA and partners' Soil Moisture Active Passive (SMAP) and Gravity Recovery and Climate Experiment (GRACE) missions, significantly extend our ability to estimate the volume of water storage, including water changes over land, water mass changes over oceans and mass changes of ice sheets. New activities within GEWEX to obtain reliable estimates of the turbulent surface exchanges of energy and water are also underway.

Concurrent with the improvement of our measurement capabilities, the climate system has experienced substantial variability, driven by both natural processes and anthropogenic influences. This variability has been observed at unprecedented detail and at scales ranging from the mesoscale to the synoptic on decadal and climate timescales. In addition to the well-known changes in global mean temperature, we

are now beginning to observe global patterns in the change of precipitation, radiation and clouds, which provide another opportunity to understand the processes involved in energy and water exchanges, and to assess our capabilities in correctly simulating them.

It is time to make use of these opportunities to significantly advance our understanding of key energy and water cycle processes at a wide range of space and time scales, and to provide a more insightful evaluation of the representation of these processes within models. This will require new ways of both analyzing the observations and diagnosing model behavior. The keys to success will be in skillfully combining different data sets and exploring relationships between them, as well as in the ability of models to reproduce those relationships correctly.

GEWEX Process Evaluation Study (GEWEX-PROES)

In response to this challenge, a new GEWEX-wide activity, the GEWEX Process Evaluation Study, will take advantage of the opportunities that the combination of many of the existing data sets provide. The goal of GEWEX-PROES is to advance process understanding and representation in models, both through new efforts and in collaboration with already existing key groups and activities. Broadly, the goals are to:

1. provide a better understanding of the mechanisms involved in energy and water exchanges on Earth;
2. diagnose the sources of major model shortcomings; and
3. use the knowledge gained in new treatments of energy and water exchange processes in models.

GEWEX, through its decades of experience in producing global data sets, diagnosing model performance and executing comprehensive process studies, is well positioned to take on the challenge of optimally exploiting these developments.

A strong connectivity to other efforts also lies at the very heart of GEWEX-PROES and must become one of its main strengths. To avoid duplication of labor, it is important to consult the wider community when designing the implementation of GEWEX-PROES. Particularly strong connections beyond GEWEX include, but are not limited to the following:

- the World Climate Research Programme (WCRP) Grand Challenge on Clouds, Circulation and Climate Sensitivity and Grand Challenge on Water Availability;
- CMIP and the Cloud Feedback Model Intercomparison Project (CFMIP);
- Observations for Model Intercomparison Projects (obs4MIPs);
- Analysis for Model Intercomparison Projects (ana4MIPs);
- the World Meteorological Organization (WMO) and WCRP Working Group on Numerical Experimentation (WGNE);
- the WCRP Working Group on Seasonal to Interannual Prediction (WGSIP);
- the WCRP Working Group on Coupled Modeling (WGCM);
- the WCRP Data advisory Council (WDAC);
- the WCRP Modeling Advisory Council (WMAC);
- WCRP Climate and Cryosphere (CliC) Project; and
- WCRP Stratospheric Processes and their Role in Climate (SPARC) Project.

We are looking forward to a strong consultation process with the wider community to design GEWEX-PROES as a valuable addition to our common goal to better understand and predict climate system behavior.

Scope and Structure of GEWEX-PROES

PROES is proposed around specific projects, each constructing an infrastructure that will include three main components, all of which aim to enable the global, regional and local analysis of key processes focused on energy and water exchanges. The first component is the collection and provision of data sets at a time and space resolution that allows for given process evaluation at a range of time scales for both the real world and in models. The second component focuses on developing, applying and serving diagnostic tools that enable the process evaluation. Finally, the third component will focus on the design, execution and analysis of model simulations. All three components plan to take advantage of and strongly collaborate with existing efforts and to add value to them through additional rather than duplicative work.

Proposed Activities for GEWEX-PROES

Four GEWEX-PROES activities are currently in different phases of development and include: (i) an upper tropospheric clouds and convection process study; (ii) a radiation kernels study; (iii) an ice sheet surface mass and energy balance study; and (iv) a mid-latitude storms study. More details about these activities, their goals and how they are to be implemented will be forthcoming in future GEWEX newsletters.

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